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Title of Invention:
Continuously forming and presenting bags for packaging

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CONTINUOUSLY FORMING AND PRESENTING BAGS FOR PACKAGING

TECHNICAL FIELD

This invention relates to packaging apparatus and methods.

BACKGROUND ART

The use of plastic bags and wraps for meat and other products is continuing to increase.

Traditionally plastics film manufacturers have supplied bags to packaging houses in single units, as taped bags or bags in a roll.

The film manufacturer often supplies a bagging apparatus which is designed to dispense their bags in a convenient manner. One such machine is that supplied by W.R. Grace & Co. Their method and apparatus for sequentially filling taped bags being described by United Kingdom Patent No. 1240371.

Another machine which has been used in New Zealand is incorporated in a system known as the DANAFLEX. The system which involves the use of a machine which both makes bags from a roll of tube stock and sequentially presents the bags in an open condition for loading.

The major disadvantage of the taped bag systems such as the that supplied by W.R. Grace & Co referred to earlier is cost, obviously there being additional costs for taping the bags in first place.

The DANAFLEX system provides the user with continuity of supply and is capable of reducing the cost of packaging however the apparatus is not

suitable for streamlined "in-line" processing which is a major disadvantage.

US Patent No. 4,586,318 discloses a method of continuously forming and filling plastic bags. The operational sequence involves slitting and sealing film into a bag and filling the bag at a station.

US Patent No. 4694638 discloses a bag which is formed from a roll of web material. A blower directs a stream of air to the open edge of the web to inflate the bag for filling.

US Patent No. 5094061 discloses an apparatus for packaging products which has a bag forming means and a filling station. The bags are formed from tubestock.

The apparatus described in the aforementioned US patents an opening is formed in the bags by creating a slit in one surface of the film web. Plastics film is easily ripped once a slit is commenced and such systems are only suitable where there is adequate technical supervision available to ensure the machinery runs correctly.

US Patent No. 4553376 describes an apparatus which draws a web of plastic film over an opening core which opens the film. The film is drawn over an object to be packed and cut to length.

US Patent No. 3557526 describes a device for packaging objects in tabular casings, cutting and welding the casings to form individual bags for filling. Whilst the device described in US Patent No. 3557526 makes bags on site and presents them for loading, the device is large and sequence of operation is such that it is not suitable for streamlined in-line processing.

It is an object of the present invention to provide a bag making and

dispensing apparatus and a method of using same which will cost competitive and which addresses the disadvantages of the existing apparatus referred to herein.

DISCLOSURE OF INVENTION

According to a first aspect of the present invention there is provided a method of continuously forming and presenting bags comprising the steps of conveying an overlaid film web to a sealing head, creating a cross-wise seal in the film web with sealing means whilst releasing an advanced portion of the film web by cutting the web with release means positioned downstream of said sealing means, further advancing the advanced portion of the film web to a predetermined loading position.

The sealing and release means can advance on the film web simultaneously.

The method can include the further step of clamping the film web adjacent said release means prior to cutting taking place.

The film web can be conveyed to and away from the sealing means by independent first and second conveying means.

The second conveying means can operate to convey the advanced portion of the web to the predetermined position whilst a seal is being completed in the film web.

An unsealed end of the advanced portion of the web can be opened by an air stream once it reaches a loading position.

The unsealed end of the advanced portion of the web can be secured by a suction device at the loading position.

According to a further aspect of the present invention there is provided apparatus for continuously forming and presenting bags comprising; means for conveying an overlaid film web to a sealing head, sealing means at the film head, independent means for advancing the film web to and away from the sealing head, release means positioned downstream of the sealing means, the arrangement and construction being such that on sequential operation of the sealing means, release means, and said means for advancing the film web there is provided continuous presentation and positioning of a released portion of the film web in the form of a bag at a predetermined position.

The sealing and release means can advance on the film web simultaneously.

The apparatus may include clamping means for clamping the film web adjacent said release means prior to release taking place.

The apparatus may include first and second means for independently conveying the film web to and away from the sealing head.

The second conveying means operates to convey the advanced portion of the web to a loading position whilst a seal is being completed in the film web.

The apparatus may further include an air blower directed at an unsealed end of the film web at the loading portion to open it in preparation for filling.

The apparatus may further include a suction device for securing the unsealed end of the advanced web portion at the loading position

The first conveying means may comprise a pair of nip rollers positioned

in advance of and adjacent to the sealing head.

The second conveying means may comprise a roller downstream of the sealing head and a belt conveyor which extends from the roller.

The apparatus may include timing means associated with the first and second conveying means said timing means being arranged to co-ordinate the movement of the first and second conveyor means.

BRIEF DESCRIPTION OF DRAWINGS

Figure 1: is a schematic drawing illustrating the mode of operation of the apparatus of the present invention, and

Figure 2: is a side view of an apparatus in accordance with one possible embodiment of the present invention, and

Figure 3: is a plan view of the apparatus of Figure 2, and

Figure 4: is a further side view of the apparatus of Figure 2, and

Figure 5: is a diagrammatic part side view showing important aspects of the sealing head of the apparatus in Figure 2, and

Figure 6: is a part section end view showing important aspects of the sealing head of the apparatus of Figure 2, and

Figure 7: is a plan view of a production layout incorporating the apparatus of Figures 2 to 6.

BEST MODES FOR CARRYING OUT THE INVENTION

Firstly with respect to schematic Figure 1 of the drawings, the apparatus illustrated operates to convey an overlaid film web generally indicated by

arrow 1 to a sealing head generally indicated by arrow 2. The sealing head 2 incorporates a seal bar 3, and is operable to create a cross-wise seal 4 in the film web 1 whilst releasing an advanced portion 1a (then formed into a bag) by severing the web 1, release means 5 being in a position downstream of the sealing bar 3.

The seal bar 3 and release means 5 are connected to one another and designed to advance on the web 1 simultaneously.

A clamping device 6 is positioned adjacent the release means so that the film web 1 can be clamped prior to severing.

The film web 1 is conveyed to and away from the sealing head 2 by independently operable conveying means generally indicated by arrows 7 and 8. These are described in detail later. A first of the conveying means 7 includes a pair of nip rollers 9, and a second conveying means includes co-operative nip rollers 10 and a belt conveying means 11.

An air blower 12 is positioned at a predetermined loading position and is operable to open the unsealed end 13 of the advanced web 1a at the loading position.

A suction device 14 operates to secure the unsealed end 13 of the advanced web 1a whilst it is at the loading position.

The apparatus produces plastic bags from overlaid webs of plastic tubestock, and this process is continuous.

Further particulars of the apparatus and methodology of the present invention will be described with reference firstly to Figures 2, 3 and 4 of the accompanying drawings.

The present invention provides apparatus comprising means generally indicated by arrow 15 for conveying an overlaid film web to a sealing head located in the area indicated by arrow 16, sealing means (not shown) at the sealing head, means generally indicated by arrow 18 for advancing the film web away from the sealing head, release means (not shown) positioned downstream of the sealing means the arrangement and construction being such that on sequential operation of the sealing means, release means and said means 18 for advancing the film web there is provided continuous presentation and positioning of a released portion of the film web in the form of a bag at a predetermined loading position.

The sealing and release means (described in detail later) advance on the film web simultaneously.

The apparatus includes clamping means (not shown) for clamping the film web adjacent said release means prior to release taking place.

The apparatus includes timing means associated with the conveying means 15, 18 said timing means being arranged to co-ordinate the movement of the first conveyor means 15 and sequential operation of said second conveyor means 18 and to co-ordinate activity at the sealing head.

The timing means includes an endless belt conveying means 22 coupled to said first conveyor means 15, a fixed sensor 23 and a movable sensor 24 associated with said endless belt 22.

Elements of the apparatus are mounted with respect to a skeletal frame generally indicated by arrow 25 which includes base members 26, sidewall members 27, upper frame members 28. The frame 25 can be supported with respect to the ground by wheels 29, although foot

members (not shown) may equally suffice. Columns 30 can mount a shaft (not shown) for supporting a roll of tubestock 31.

First conveyor means 15 comprises a pair of nip rollers 32 and a web of film 20 is extended from the roll 31 to the nip rollers 32 over the surface of guide rollers 33. The nip rollers 32 are driven by a motor 34 via transmission belt 35 which may be tensioned by tension arm 36.

Second conveyor means 18 comprises a combination of nip rollers 37 driven by a motor 38, transmission belt 39, which may be tensioned by a tension arm 40 and a plurality of spaced belts 42.

The frame may support a removable cover 44 and a loading surface plate 45 which provides under surface support for the belts 42.

The rollers, tension arms, motors and transmission means are conventionally mounted with respect to the frame.

Figures 5 and 6 illustrate the sealing means, release means and clamping means in detail.

Figure 5 is a side view of the sealing head which is flanked by nip rollers 32 and 37. In Figure 6 the clamp bar and its relationship to an overhead anvil is shown to the left hand side of the figure and to the right hand side of the figure, the sealing means. For clarity some fixed components are not shown or described.

The sealing means indicated by arrow 46 comprises a fixed anvil 47, and pistons 48 mounting a sealing bar generally indicated by arrow 49. The sealing bar is in several parts and comprises a base 50 fixed to the piston 48 and a bar 51. The seal bar 51 and base 50 are moveable relative to one another and a series of springs 52 ensure a determined spacing between

them when the sealing means is in an open condition.

The base 50 mounts a cutting knife 53. When the sealing bar 49 is driven onto the anvil 47 by piston 48 the base 50 continues to travel against the bias of springs 52 and knife 53 will cut the web 54. During sealing and cutting of the web advanced portions 55 of the web are restrained by clamping means generally indicated by arrow 36.

The clamping means 56 comprises a clamp head 57, support 58 and a fixed and opposing clamp stop 59. The clamp head 57 is driven into contact with the clamp stop 59 by pistons 60.

The timing of the movement of the nip rollers 32, 37, and thus the advancement of the web, the activation of the pistons driving the sealing means 46 and knife 53, and the clamping means 56 are all co-ordinated by a timing and control devices as is the length of the advanced portion (formed bags) of the web. The prior art indicates that there are numerous choices for timing and controlling the activity of the various driving mechanisms and in the present case it has been found to be convenient to initiate sequences using sensors 23 and 24 (see figure 2). Both sensors are visual sensors capable of detecting a mark on conveyor belt 22. The fixed sensor can be used to initiate and co-ordinate the activity of motors 34, and 38 and the advancement and retraction of the pistons 48 and 60.

The operational sequences of the apparatus can be best understood with reference to Figures 2 and 5 of the drawings. At the instance when a mark on belt 22 reaches fixed sensor 23 the apparatus is at rest.

At start up the film web is driven forward by rollers 32. The belt 22 moves a corresponding distance, and when the mark on the belt reaches moveable sensor 24 the driving rollers are stopped. The seal bar 49 and

clamp head 57 are driven upwards by the respective driving pistons. The knife 53 cuts the web adjacent the sealing bar. Whilst a heat seal is being formed in the captured portion of the web 54 the clamp head 57 is retracted and the second conveying means advances the advanced portion of the web 54 in the form of a bag to the loading position adjacent the sealing head. The positioning of the movable sensor 24 can be adjusted to determine bag length.

When the bag reaches the loading position the suction cups 14 and blower 12 are activated to open the trailing open end of the bag. Once a loaded bag is moved from the loading position the cycle restarts.

Figure 7 illustrates a possible layout using apparatus in accordance with the present invention. As discussed previously the apparatus presents a bag 60 with the open end 62 facing loading surface 63. Product 64 can then be manually or automatically moved from the loading surface 63 into the bag 60 which is then manually placed on a downstream position such as to conveyor 65 which may be used to transport the packages to other stations such as a bag closure station (not shown).

For larger cuts of meat it is common for the cuts to first be loaded on what is called a horn. A horn is basically a forked device (a larger "hand") and if such is used in conjunction with the present apparatus a horn 66 can be arranged to be moved automatically or by hand to load each bag as indicated.

It is noted that the suggested layout will enable an operator to stand square on and to complete the management of the packaging of the produce into the bags without excessive movement.

The apparatus can be readily interposed or set up at the end of a

conveying system, with the bag opening facing the direction from which the product is delivered.

Aspects of the present invention have been described by way of example only and it should be appreciated that modifications and additions may be made thereto without departing from the scope thereof as defined in the appended claims.

WHAT WE CLAIM IS:

1. A method of continuously forming and presenting bags comprising the steps of: conveying an overlaid plastics tubestock film web to a sealing head, creating a cross-wise seal in the film web with sealing means whilst releasing an advanced portion of the film web by cutting the web with release means positioned downstream of said sealing means, further advancing the advanced portion of the film web to a predetermined loading position.
2. A method as claimed in claim 1 wherein the film web is conveyed to and away from the sealing means by independent first and second conveying means.
3. A method as claimed in claim 2 wherein the second conveying means operates to convey the advanced portion of the web to the predetermined loading position whilst a seal is being completed in the film web.
4. A method as claimed in any one of claims 1 to 3 wherein the sealing and release means advance on the film web simultaneously.
5. A method as claimed in any one of claims 1 to 4 including the further step of clamping the film web adjacent said release means prior to cutting taking place.
6. A method as claimed in any one of claims 1 to 5 wherein an unsealed end of the advanced portion of the web is opened by an air stream once it reaches the loading position.

7. A method as claimed in claim 6 wherein the unsealed end of the advance portion of the web is secured by a suction device at the loading position.
8. Apparatus for continuously forming and presenting bags comprising; means for conveying an overlaid plastics tubestock film web to a sealing head, sealing means at the sealing head, independent means for advancing the film web to and away from the sealing head, and release means positioned downstream of the sealing means, the arrangement and construction being such that on sequential operation of the sealing means, release means, and said means for advancing the film web there is provided continuous presentation and positioning of a released portion of the film web in the form of a bag to a predetermined loading position.
9. Apparatus as claimed in claim 8, wherein the sealing and release means advance on the film web simultaneously.
10. Apparatus as claimed in claim 8 or claim 9 including clamping means for clamping the film web adjacent said release means prior to release taking place.
11. Apparatus as claimed in any one of claims 8 to 10 including first and second means for independently conveying the film web to and away from the sealing head.
12. Apparatus as claimed in claim 11 wherein said second conveying means operates to convey the advance portion of the web to a loading position whilst a seal is being completed in the film web.

13. Apparatus as claimed in any one of claims 8 to 12 further including an air blower directed at an unsealed end of the film web at the loading portion to open it in preparation for filling.
14. Apparatus as claimed in any one of claims 8 to 13 further including a suction device for securing the unsealed end of the advanced portion of the web at the loading position.
15. Apparatus as claimed in any one of claims 8 to 14 wherein said first conveying means comprises a pair of nip rollers positioned in advance of and adjacent to the sealing head.
16. Apparatus as claimed in any one of claims 8 to 15 wherein the second conveying means comprises a pair of nip rollers downstream of the sealing head and a belt conveyor which extends from the nip rollers.
17. Apparatus as claimed in any one of claims 8 to 16 including timing means associated with the first and second conveying means and the sealing said timing means being arranged to co-ordinate the movement of the first and second conveyor means.
18. A method of making and presenting a bag substantially as herein described with reference to the accompanying drawings.
19. Apparatus for making and presenting bags substantially as herein described with reference to the accompanying drawings.

END OF CLAIMS

Trigon Industries Limited

by their Attorneys

JAMES & WELLS

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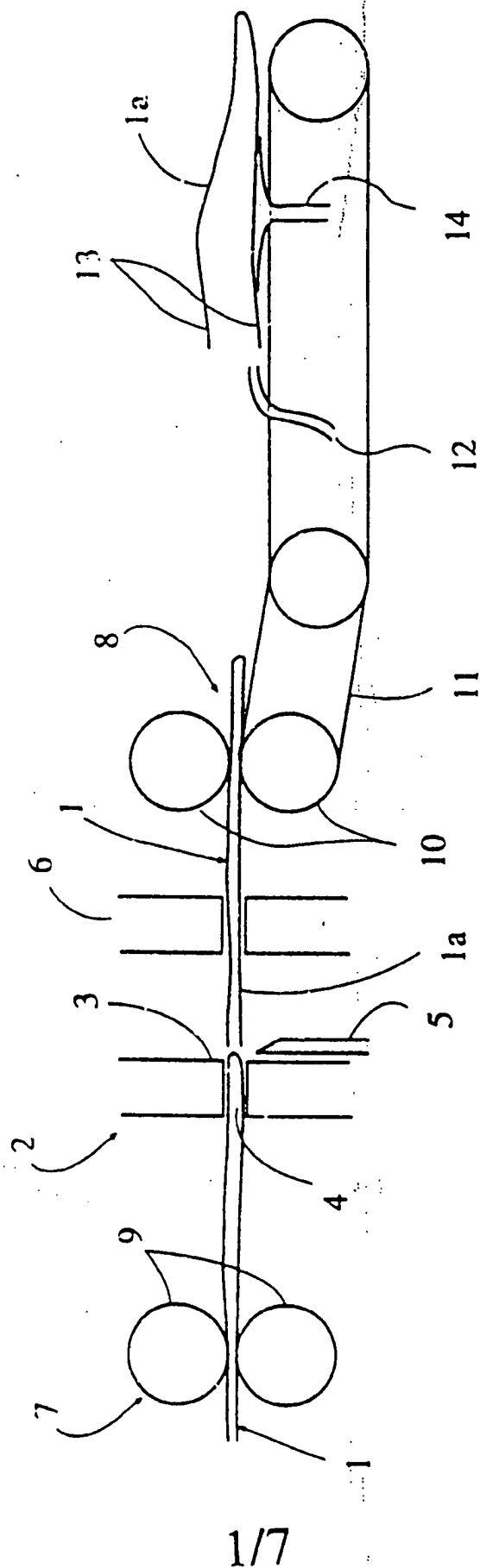


Fig. 1

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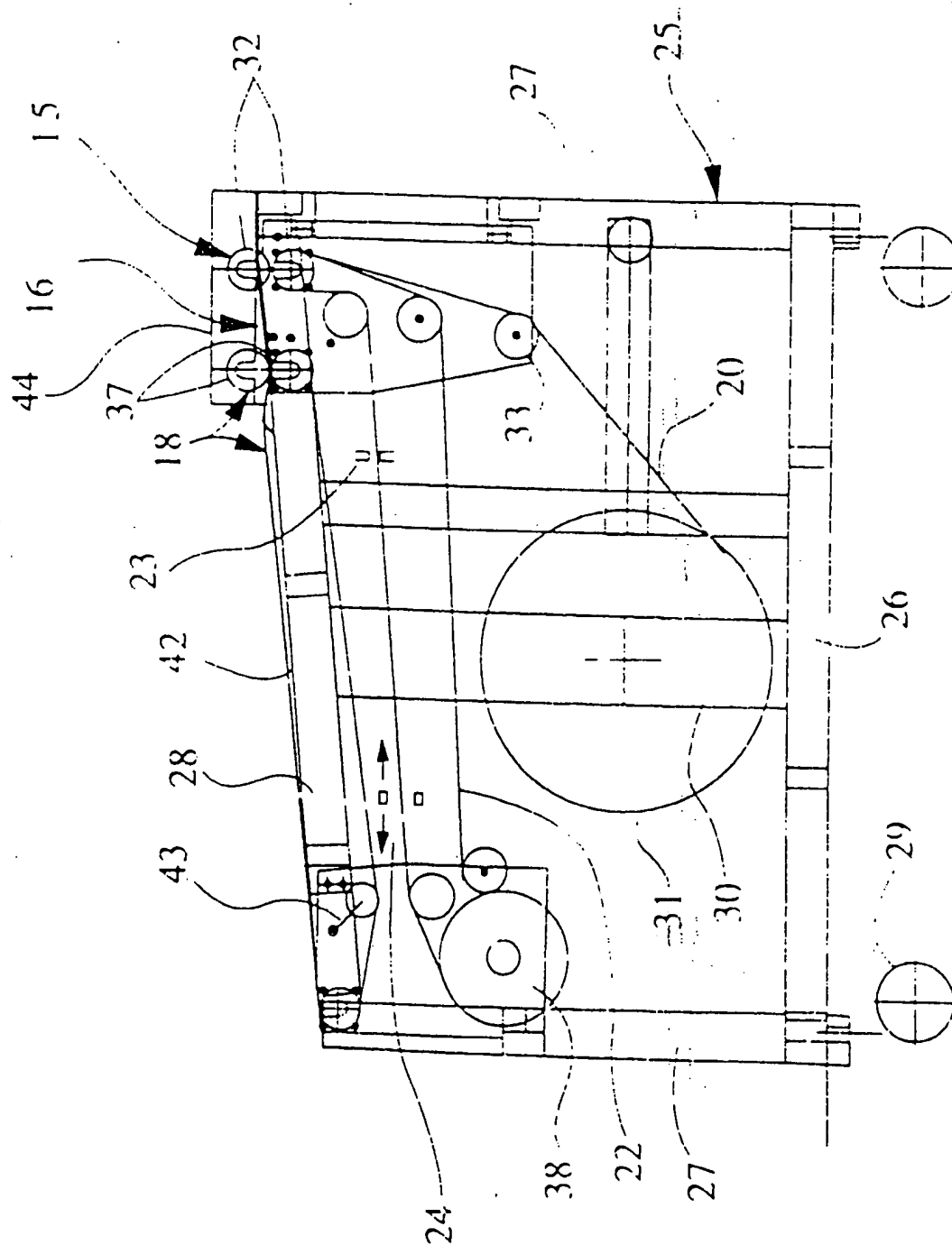


Fig. 2

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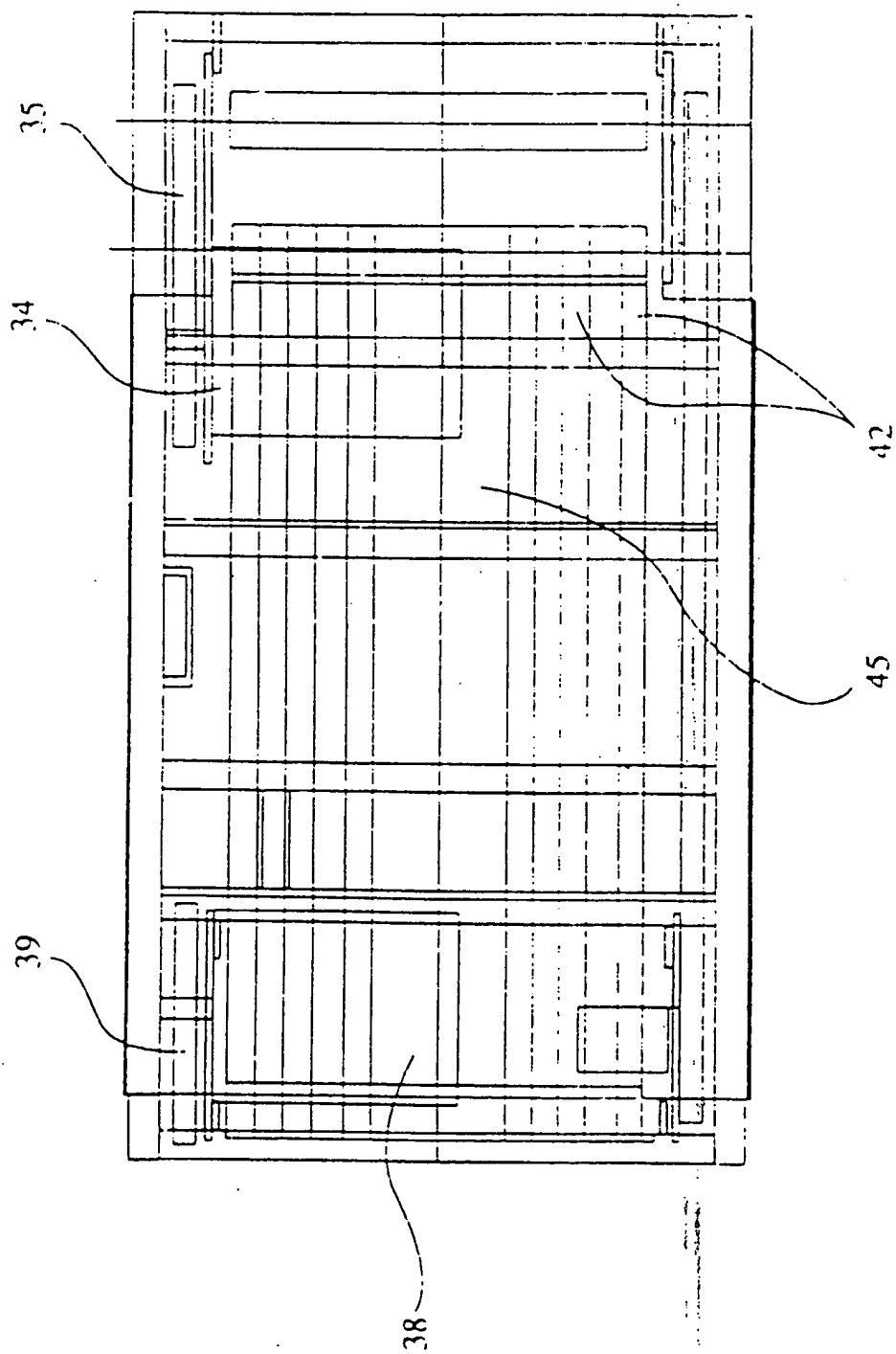


Fig. 3

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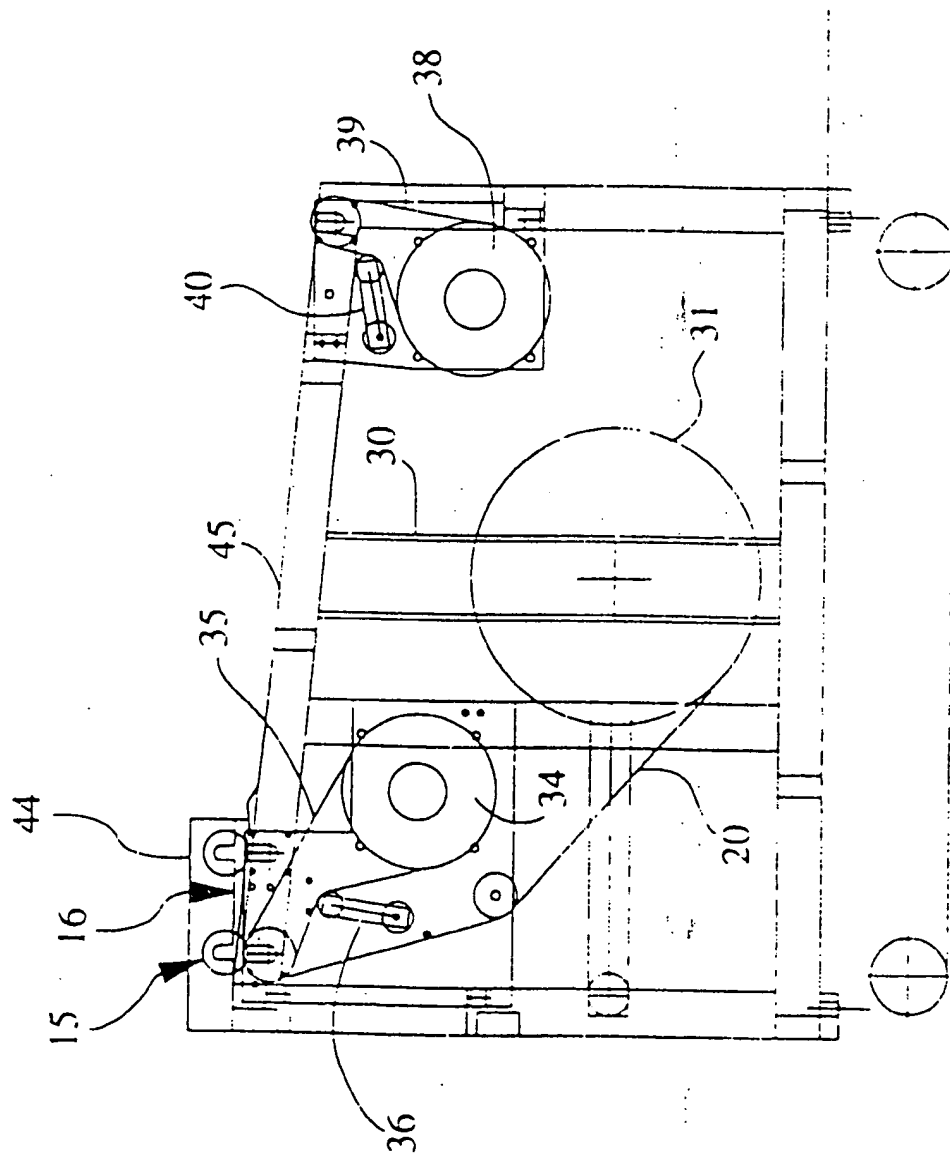


Fig. 4

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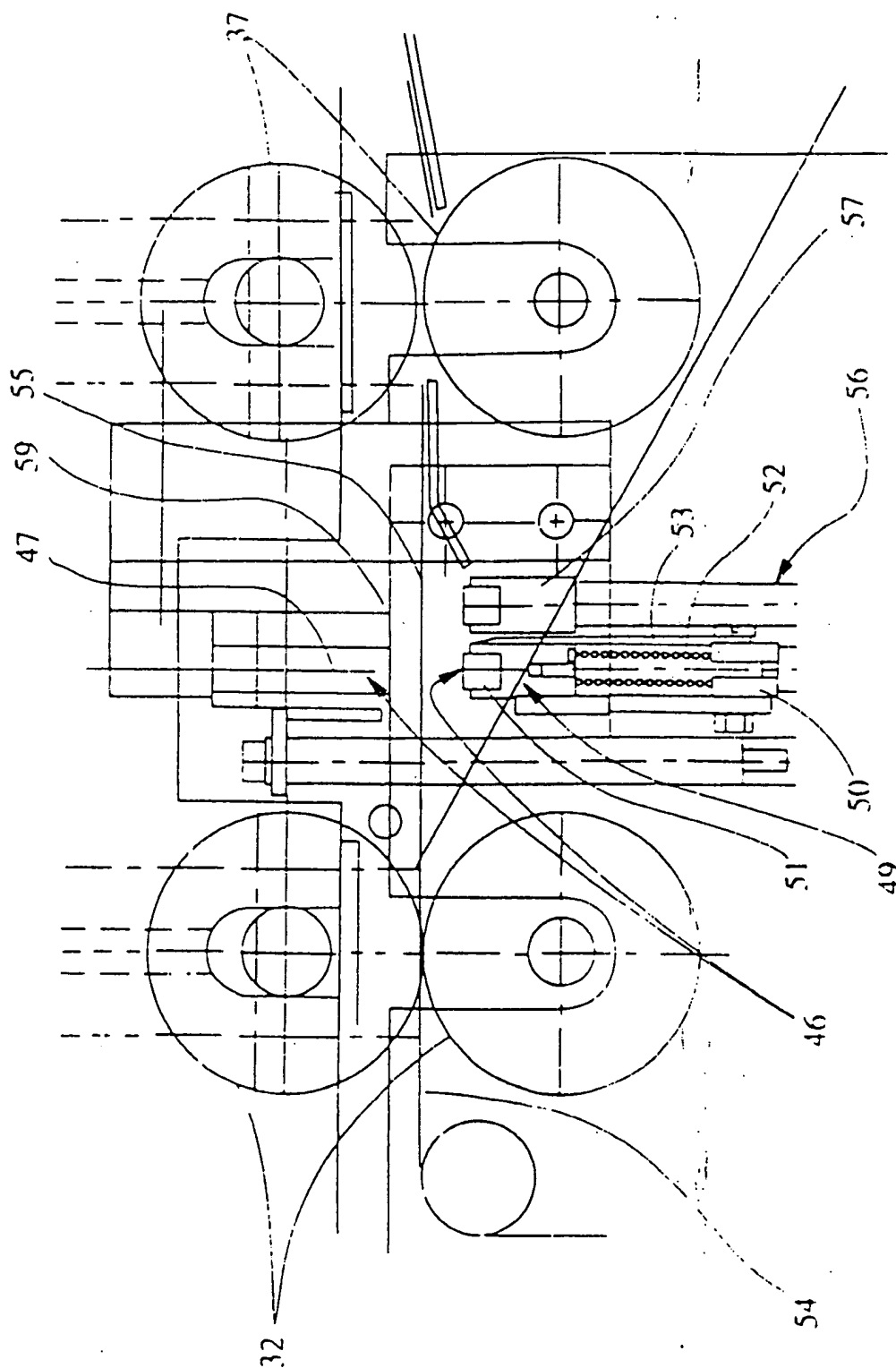


Fig. 5

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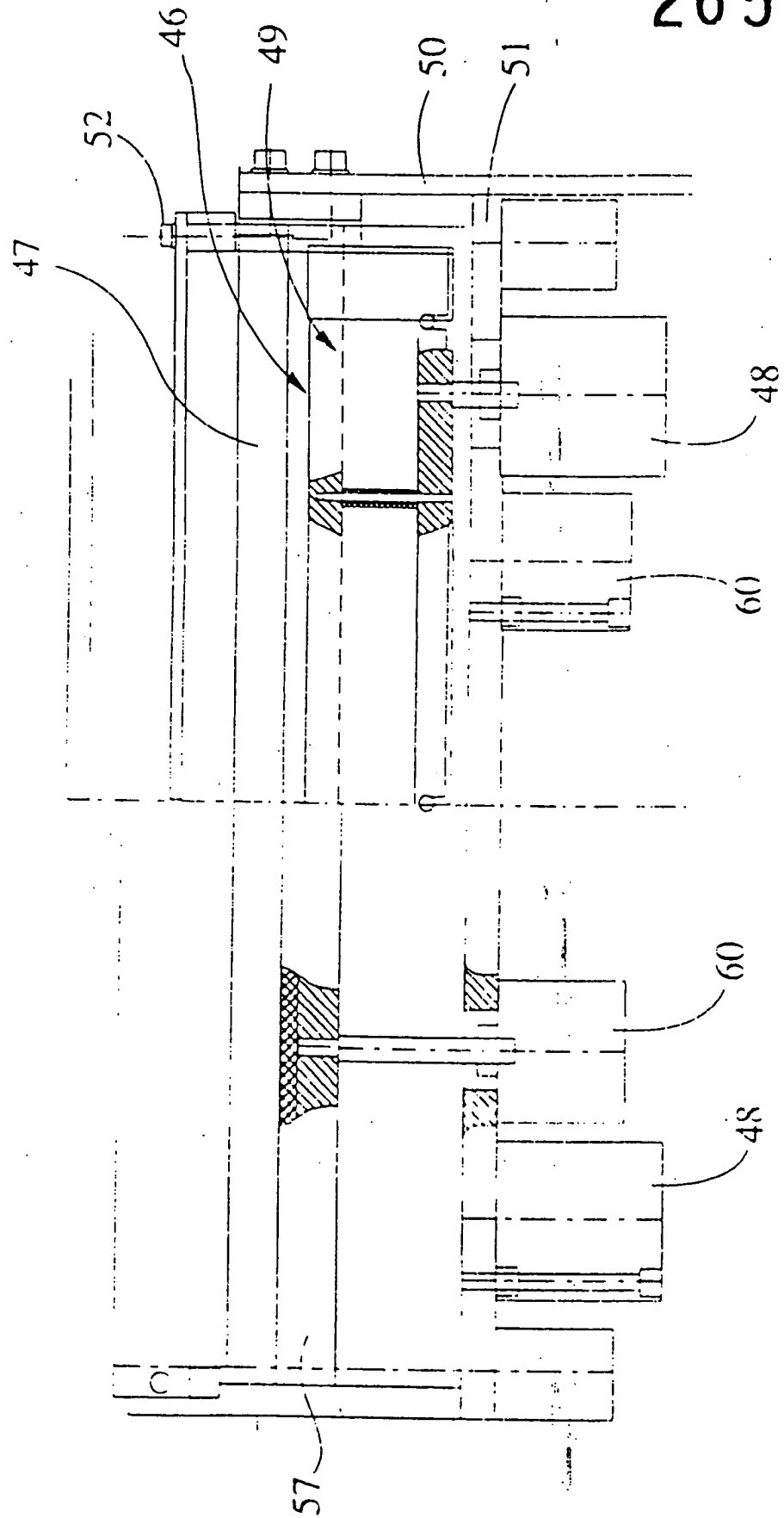


Fig. 6

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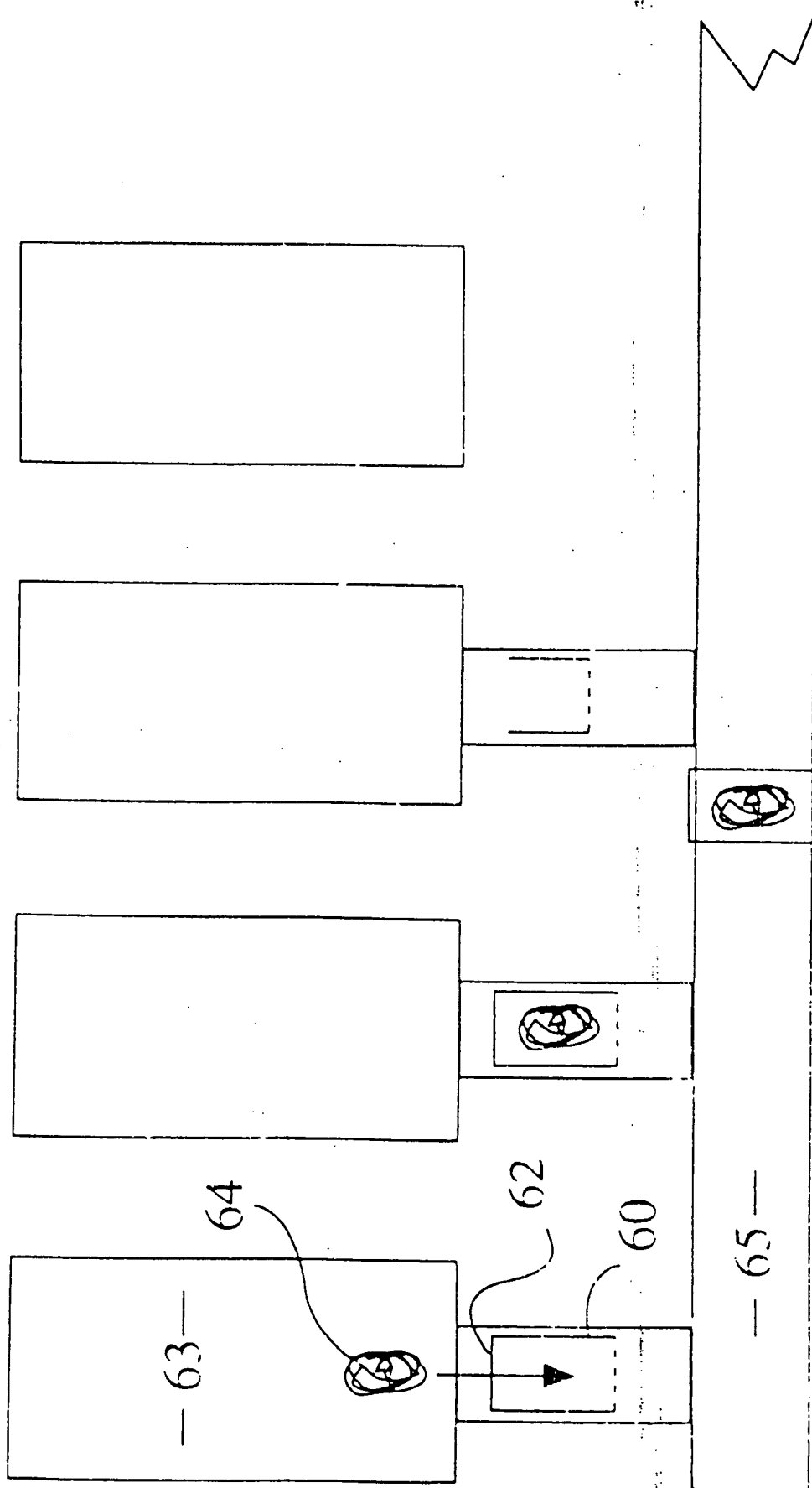


Fig. 7